CURRENT LITERATURE

MINOR NOTICES

Mosses and ferns.—A third edition of CAMPBELL'S well known textbook[1] has appeared. The body of the text is the same as in the second edition of 1905, the new material being added in the form of an appendix, under the corresponding chapter headings. In addition to numerous contributions by other investigators, the appendix contains noteworthy results of the author in his investigations of tropical liverworts and ferns. The bibliography is completely recast, including 772 titles, distributed among 336 authors. The author has rendered an important service to morphologists in bringing up to date, and in convenient form, our knowledge of these great groups.—J. M. C.

NOTES FOR STUDENTS

Mitochondria.—GUILLIERMOND has published a number of short reports dealing with the results of his investigations on the nature and function of mitochondria. In a paper[2] dealing with the origin of chromoplasts and pigments, he finds that chromoplasts are formed from mitochondria, more especially from the elongated forms called chondriocontes; and that pigments of the xanthophyll and carotin groups are elaborated either (1) directly by the mitochondria, or (2) by chromoplasts which arose from mitochondria, or (3) by chromoplasts resulting from a metamorphosis of chloroplasts which in turn arose from mitochondria. Added interest is given because of the fact that in a great many plants the process can be observed in the living material under the microscope. Both granular and crystalline pigments have the same origin. Epidermal cells from petals of *Iris germanica*, *Tulipa suaveolens*, *Tropaeolum majus*, and young fruits of *Arum maculatum*, *Asparagus officinalis*, and numerous others furnished the material for this study.

In a later paper[3] dealing with the chondrium of *Tulipa*, he reports that the mitochondria are easily visible in the living material under the oil immersion lens. Epidermal cells from petals are used. The mitochondria are long, thin, and undulate, although smaller granular and rod mitochondria are present. Material is at its best just about the time the flowers first open. The reviewer has verified these observations with the yellow-flowered variety, but was not

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[1] CAMPBELL, D. H., The structure and development of mosses and ferns (Archegoniatae). 3d ed. 8vo. pp. 708. *figs. 322*. New York: Macmillan Co. 1918. $4.50.

[2] GUILLIERMOND, A., Compt. Rend. Acad. Sci. **164**:232–235. 1917.

[3] ———, *Loc. cit.* **164**:407–409. 1917.

successful with the white ones, and found further that the mitochondria begin to disintegrate in the course of 30 minutes after the mount is made.

In a third paper[4] dealing with alterations of the chondrium, he finds that "the mitochondria are the most fragile elements of the cell, and it is through them that the first signs of degeneration and the first symptoms of trouble due to osmotic changes are manifested." The alteration consists of the transformation of the mitochondria into vesicles having the aspect of vacuoles and giving the cytoplasm an alveolar appearance. This, the author remarks, is interesting when we think of BÜTSCHLI's alveolar structures.

In a fourth paper[5] dealing with the fixation of cytoplasm, he finds that from the point of view of their action on the chondrium fixing agents may be grouped in three classes: (1) alcohol, Mann's, Zenker's, and Carnoy's fluids all disturb the structure of the cytoplasm and destroy the mitochondria; (2) picric acid, mercuric chloride, formalin, and strong Flemming's generally cause a pronounced shriveling of the mitochondria, often accompanied by a diminution of the chromaticity of these structures; (3) Altmann's, Benda's, Regaud's, and Flemming's with only a trace of acetic acid are the fixing agents commonly used for fixing mitochondria and the cytoplasm as nearly like living as possible. In general it is those reagents which contain alcohol or acetic acid which alter the mitochondria most.

MOTTIER[6] has published a valuable contribution to the study of mitochondria, not only in the new facts he has revealed, but more especially in the account of his methods, which will enable workers much less qualified to take up studies in this interesting field. In the main he used Flemming's fluid, with very much reduced amounts of acetic acid for a fixative and iron haematoxylin and crystal violet for stains. For material he used root tips of *Pisum sativum*, *Zea Mays*, and *Adiantum pedatum;* the thallus of *Marchantia polymorpha*, *Anthoceros*, and *Pallavacinia;* seedlings of *Pinus Banksiana;* leaves of *Elodea canadensis;* and certain algae.

He finds that root tips of *Pisum* furnish excellent material for a study of the primordia of plastids and their transformations. Mitochondria-like structures are very numerous, such as rods of various lengths and thicknesses, straight, variously curved and bent, and also numerous smaller granules and slender delicate rods. Leucoplasts develop from the larger structures, but the smaller ones do not form plastids. Although these structures all give the same histochemical reactions, the term chondriosome (mitochondrium) is reserved for those smaller structures which do not form plastids. The former he calls "plastid primordia." *Zea Mays* is similar in all essentials to *Pisum*. In *Marchantia* the "plastid primordia" are more readily distinguished from the

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[4] GUILLERMOND, A., *Loc. cit.* **164**:609–612. 1917.

[5] ———, *Loc. cit.* **164**:643–646. 1917.

[6] MOTTIER, D. A., Chondriosomes and the primordia of chloroplasts and leucoplasts. Ann. Botany **32**:91–114. *pl. 1.* 1918.

mitochondria in that they are larger and rounded, while the mitochondria are very small granular or rod forms. Cells from the thallus of *Anthoceros* were studied because they have each a single chloroplast and hence furnish favorable objects for determining whether mitochondria are merely disorganized chloroplasts. This question is answered in the negative. In *Adiantum pedatum* he finds that the mitochondria are small, granular, and rod-shaped. Discussion is here confined to root tips, and we are promised a subsequent paper dealing with other parts. The "plastid primordia" are rounded, lenticular, and rod-shaped, but much larger than the mitochondria. The rod-shaped "primordia" which do not develop into leucoplasts "continue to elongate into long-drawn-out threads and finally disappear." In the younger growing parts of the stem of *Pinus Banksiana* numerous small rounded bodies with colorless centers (plastid primordia) and densely staining granules (mitochondria) were found. In the older parts these bodies with the colorless centers form the plastids, while the granular mitochondria have become larger or formed rod mitochondria. In the leaves of *Elodea canadensis* the primordia are rod-shaped and can easily be traced in their transformation into plastids. The mitochondria are very numerous, and in cells with fully developed chloroplasts they are globular and even rod-shaped, differing from the primordia only in size. We are promised a later paper dealing with his results on *Hydrodictyon*.

GUILLIERMOND includes under the term mitochondria all those structures which give the same histochemical reactions, regardless of their functions; while MOTTIER, on the other hand, considers only those structures which do not develop into plastids to be included under the term. Both, however, agree that these structures are "morphological units of the cell with the same rank as the nucleus." MOTTIER goes farther and asks, "What characteristics are transmitted solely by the nucleus, and what by the primordia of plastids and by the chondriosomes? There are many transmissible characteristics which cannot as yet be definitely expressed in any Mendelian ratio. To claim that certain phenomena of fluctuating variations and other numerous characteristics, Mendelian or otherwise, owe their appearance and transmission to the primordia of plastids and chondriosomes may be a daring hypothesis, but if, as there is good ground to believe, these bodies are permanent organs, there is no escape from some such assumption."—RAY C. FRIESNER.

Units of vegetation and their classification.—With the advance of the science of ecology there has been a gradual evolution of opinion as to the units most suitable for the analysis and study of vegetation. The earlier stages of this evolution have been well discussed by Moss,[7] who also advanced the developmental concept of the plant formation. The half decade following this paper passed without a further notable contribution to the subject, but recently three

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[7] Moss, C. E., The fundamental units of vegetation. New Phytol. **9**:18–53. 1910.